DOCUMENT RESUME

ED 180 997 SP 015 398

AUTHOR	Seefeldt, Vern: Gould, Daniel
TITLE	Physical and Psychological Effects of Athletic Competition on Children and Youth.
INSTITUTION	ERIC Clearinghouse on Teacher Education, Washington, D.C.
SPONS AGENCY	National Inst. of Education (DHEW), Washington, D.C.
PUB DATE	Feb 80
NOTE	41p.
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Anxiety: *Athletics: Child Development: *Children: Child Welfare: Competition: *Emotional Development: Maturation: Physical Characteristics: *Physical Development: *Psychological Patterns: Socialization: Stress Variables: *Youth
IDENTIFIERS	Information Analysis Products

ABSTRACT

Research examining the effects of sports participation on children and youth is reviewed from the perspective of psychological and physical development. Statistical information regarding the participation rate in different kinds of youth sports is given. The effects of prolonged athletic activity on bone, muscle, and adipose tissue growth is considered, as well as the general effect of sports on overall growth. Injuries due to repeated stress and physical (muscular) trauma, and biological maturation are also considered. The psychological effects are examined through a discussion of the meaning of competition and of the socializing effects sports organizations exert on participants. The monograph terminates with a discussion of unresolved problems in youth sports competition, including the exclusion and retention of athletes, possible alternatives to highly competitive athletic programs, and the need for qualified and sensitive adult leaders in the field of youth sports. (LH)

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PHYSICAL AND PSYCHOLOGICAL EFFECTS OF ATHLETIC COMPETITION ON CHILDREN AND YOUTH

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February 1980 SP 015 398

SP 015 398

The ERIC Clearinghouse on Teacher Education is funded by the National Institute of Education. The material in this publication was prepared pursuant to a contract with the National Institute of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Prior to publication, the manuscript was submitted to an external referee for critical review and determination of professional competence. This publication has met such standards. Points of view or opinions expressed in this publication do not necessarily represent the official view or opinions of the Clearinghouse, or the National Institute of Education.

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FOREWORD

Millions of children everywhere are competing in youth sports programs sponsored by their schools, youth agencies, community recreation departments, and many other nonschool groups. Supporting the growth of these programs are popular claims that sport participation is important and enhances child development. But is there any basis in fact for this statement?

In Physical and Psychological Effects of Athletic Competition on Children and Youth, Vern Seefeldt and Daniel Gould, experts in the field of youth sports from Michigan State University, review significant research to examine the effects of sports participation on youth. Although the evidence is sometimes fragmentary, they conclude that competition, if properly handled, is a healthy aspect of growing up, and that youth sports programs are alive and well, but in need of a few changes. Intended for coaches, educators, sport administrators, and parents, this monograph summarizes research from the past eighty years in a practical, readable manner. For undergraduate and graduate professional students, this book should prove to be an excellent resource.

Any kind of athletic competition for youth must first consider, above all else, the child's physical and psychological welfare. Physically, a youngster can improve his or her growth and fitness through competitive sport experiences, if the program is conducted properly and does not cause undue stress and anxiety. It is when program supervisors lose sight of the child's well-being, and young athletes are permitted to play despite injuries (which sometimes cannot be detected), that irreversible damage may occur to young growing bones and muscles.

Because of the physical and psychological discrepancies among youngsters of the same chronological age, the authors strongly suggest that other factors--maturational level, for example--be considered in forming athletic teams. Suggestions may help with the problem of some children being excluded from sport participation because their chronological age (the traditional determinant of team membership) does not agree with their biological age.

Psychologically, a child's mental and emotional development and socialization begins at birth. During childhood and adolescence, competitive experiences can foster psychological growth, provided the program emphasizes fun, not winning.

Successful youth sports programs need knowledgeable, skilled coaches, who can provide young athletes with consistent role models of good sportsmanship. The authors note that education programs are essential to help coaches, many of whom volunteer without pay, improve their skills and knowledge.

Too often adults involved in youth sports programs are blind to the children's needs, as they see a program only through adult eyes. Physical and Psychological Effects of Athletic Competition on Children and Youth gives the reader a thorough understanding of the implications of youth sports competition. I invite you to read on, for the knowledge that you gain may improve the lives of those children you touch.

--LAURIE PRIEST
Associate for Health, Physical Education, and Recreation
ERIC Clearinghouse on Teacher Education

Editor's Note: The ERIC Clearinghouse on Teacher Education is pleased to publish this information analysis product reviewing the literature on the important topic of youth sports. We gratefully acknowledge the contributions of the authors. Readers are invited to comment on this monograph and to submit related documents to the Clearinghouse for possible inclusion in the Educational Resources Information Center (ERIC) system. Documents may include project descriptions, curriculum guides, instructional materials, conference speeches, and other nonjournal materials. For details, write to the Information Analyst, ERIC Clearinghouse on Teacher Education, One Dupont Circle, Suite 616, Washington, DC 20036.

--SHARON G. BOARDMAN
Editor, ERIC Clearinghouse
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By

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EXTENT OF PARTICIPATION IN YOUTH SPORTS

Competitive athletics for children and youth have become a way of life in many communities. From their modest beginning in 1903 on the playgrounds of New York City to their present proliferation to virtually every community throughout the nation, there has been a phenomenal growth in competitive athletics for children.

A survey conducted by the Athletic Institute (1975) placed the number of participants in nonschool-sponsored youth sports at approximately 20 million. Figures from the Sports Participation Survey compiled by the National Federation of State High School Activities Associations (1978) indicate that 4,367,443 boys and 2,083,040 girls* in junior and senior high school participated in interscholastic athletics during 1978. A comprehensive study of athletics in the State of Michigan (Youth Sports Study, Phase I, 1976) revealed that every community in the sample provided some form of competitive athletic activities for youths.**

Statistics from school and nonschool programs indicate that youth sports programs have continued to grow, despite a belief by many that their popularity would decline when the novelty of organized competition subsided. However, evidence from the past three decades indicated that when one sport became established and its number of participants began to stabilize, another was ushered in with comparable enthusiasm.

Despite the rise and fall in popularity of specific sports, there has been an overall increase in the number of young people involved in school and nonschool athletic competition. Reasons for the increased participation are numerous: (1) Greater opportunities for girls have markedly increased the number of participants; (2) availability of more program offerings by schools and communities has increased the options for athletes; (3) modification of rules and extension of age limits to accommodate younger participants has increased the eligibility in some agency-sponsored sports to include most children from kindergarten through high school; and (4) improved

*These totals include multiple-sport participants, counted once for each sport in which they competed at the interscholastic level during the year 1978.

**The Michigan Study involved a random sample of 109,625 students, or 4.74% of the school-aged children between five and seventeen years, from 89 of Michigan's 582 school districts.

transportation has made it possible for suburban and rural residents to participate in urban programs that formerly were inaccessible to them.

Changes in Participation Patterns

Perhaps the most significant change in youth sports participation during the last decade has been the involvement of a greater number of girls, not only in sports that have always been popular with girls, but also in sports that were once traditional domains of boys. Comparison of activity preferences by boys and girls since the latter part of the nineteenth century shows that changes have taken place in the interests and activity choices of females (Fountain, 1978). Fountain's comparison of five studies (Crosswell, 1898; McGhee, 1900; Terman, 1926; Sutton-Smith and Rosenberg, 1961; Youth Sports Study, Phase I, 1976) revealed that activity patterns during the past eighty years changed in the following ways: (1) Girls showed increasingly greater involvement in traditional sports during each successive survey, from 1898 to 1976. (2) Girls increased their participation in the number of activities by maintaining their interest in games of low organization and expanding their sports participation. Conversely, boys' activities seemed to focus on seasonal sports. (3) Participation by girls showed a temporary increase until 1960 in the combative male-oriented sports of football, wrestling, and boxing, but by 1960 this trend was reversed. The reason for girls' apparent interest in combative sports, followed by a return to their former patterns, is not known. (4) Girls chose individual and dual sports more often than boys, while boys most often selected team sports. (5) Although the sports participation of both girls and boys increased during the eighty-year period, the involvement of boys was greater than that of the girls in each survey. According to the Michigan Youth Sports Study (1976), boys were also more likely than girls to remain in a specific sport throughout a season.

Although changing attitudes toward women's sports and federally mandated legislation have resulted in greater opportunities for women to engage in sports, there are still distinct differences between the sexes in the numbers who participate, and in the sports that are popular during the school-age years. Data from the National Federation of State High School Activities Associations (1979) indicate that in 1978 the number of boys engaged in interscholastic athletics was more than twice that of girls. The top ten sports, ranked according to the number of participants (see Table 1), shows that male participants are more than twice the number of females. The only exception was in the second-ranked sport, basketball for males (746,702) and track and field for females (466,093) where the participation by girls exceeded fifty percent of the value reported for boys.

Interscholastic participation was influenced by the number of sports that could be supported by individual schools during a season. The list of ten most popular sports was evenly distributed across the three seasons, with the list for males containing a fourth sport during the spring, while the females' list had four sports occurring during the winter. Six of the top ten most popular sports for males were also included in the list for females. Exceptions were football, baseball (where the female's counterpart was softball), wrestling, soccer, and golf. Women substituted volleyball, gymnastics, and field hockey as their additional three sports.

TABLE 1

Participation of Boys and Girls in the Ten Most Popular Interscholastic Sports During 1978
(Data Courtesy of the National Federation of State High School Activities Associations)

Boys			Girls	
Sport	Number of Participants	Rank	Sport	Number of Participants
Football	1,133,350	1	Basketball	537,810
Basketball	764,702	2	Track & Field (Outdoors)	466,093
Track & Field (Outdoors)	706,892	3	Volleyball	326,091
Baseball	432,853	4	Softball	179,739
Wrestling	338,328	5	Tennis	147,365
Cross Country	206,587	6	Swimming	88,062
Tennis	170,653	7	Gymnastics	84,943
Soccer	141,070	8	Cross Country	53,726
Golf	135,844	9	Field Hockey	66,174
Swimming	106,498	10	Track & Field (Indoors)	26,524

Evidence of participation in agency-sponsored, nonschool youth sports is not as available as that of school competition. Agency-sponsored sports are conducted by a variety of sponsors, including municipalities, fraternal and religious orders, service clubs, civic groups, and nationally affiliated organizations such as Boys Clubs, YMCA's, 4-H Clubs, and Little League Baseball. Problems of accountability and supervision are compounded because there is no single governing body to whom these organizations owe allegiance.

The most comprehensive report of agency-sponsored sports participation is the State of Michigan Youth Sports Study, Phases I, II, III, 1976-79. Table 2 shows the percent of participation by Michigan boys and girls in the ten most popular sports. Significantly greater numbers of children were involved in agency-sponsored than in interscholastic sports. Although these data cannot be compared directly, it is obvious that the percent of those who participated in agency-sponsored sports is far greater than could be accommodated on interscholastic teams if similar percentages were applied to most school populations.

TABLE 2

Percent of Boys and Girls Who Participated in the Ten Most Popular Agency-Sponsored Sports During 1976
(Data Courtesy of the Michigan Youth Sports Study)

Boys			Girls	
Sport	Participants (Percent of total Sample)	Rank	Sport	Participants (Percent of total Sample)
Baseball	34.3	1	Softball	19.7
Basketball	17.4	2	Swimming	15.6
Bowling	17.0	3	Bowling	12.4
Softball	15.9	4	Basketball	10.0
Swimming	13.9	5	Gymnastics	9.6
Tackle Football	12.7	6	Tennis	7.7
Flag (Touch) Football	9.1	7	Baseball	6.5
Tennis	7.1	8	Figure Skating	4.6
Wrestling	6.8	9	Track & Field	4.4
Ice Hockey	6.8	10	Soccer	4.3

Although an assessment of the relationship between school and nonschool sports participation cannot be made because comparable data are not available, a comparison is possible on children from Michigan, as data on participation in agency-sponsored sports during 1976 and in interscholastic sports during 1978 are available (see Tables 2 and 3). Many of the sports learned during childhood were on the list of most popular sports during the high school years. Participation by boys was greater than for girls in both school and nonschool sports. The two to one proportion of boys to girls who participated in interscholastic sports was similar to the national figures, but in nonschool sports the ratio was closer to three to two.

Note that the most popular school-sponsored sports were not ranked in the same order as nonschool-sponsored sports. Tackle football, the boys' most popular school-sponsored sport, was listed sixth on the nonschool list, whereas track and field, the girls' most popular school sport, was listed ninth on the nonschool list. Factors such as qualified personnel, facilities, cost of equipment, and local tradition tend to influence the sports programs that school systems and nonschool agencies sponsor.

TABLE 3

Participation of Boys and Girls in the Ten Most Popular Interscholastic Sports in the State of Michigan During 1978 (Data Courtesy of the National Federation of State High School Activities Associations)

Boys			Girls	
Sport	Number of Participants	Rank	Sport	Number of Participants
Football	51,360	1	Track & Field	25,373
Basketball	39,285	2	Basketball	20,184
Track & Field (Outdoor)	29,744	3	Softball	14,088
Baseball	28,208	4	Volleyball	13,598
Wrestling	18,200	5	Tennis	6,710
Cross Country	10,784	6	Swimming	6,180
Golf	8,748	7	Gymnastics	3,666
Tennis	8,558	8	Cross Country	2,145
Swimming	8,225	9	Skiing	1,612
Ice Hockey	2,156	10	Golf	1,375

The disparity in the numbers who participate in school and nonschool athletic programs is partially attributable to the early age of eligibility that is promoted by many nonschool agencies. Although public school personnel have generally favored a delay of athletic competition until junior high school, many nonschool agencies offer programs for children who are five or six years old.

In a sample involving 1,138 athletes representing sixteen nonschool-sponsored sports, the median age of first exposure to their sport for males was eight years and for females slightly over nine years. By age twelve, which is equivalent to the seventh grade when competition is often begun in school-sponsored programs, ninety-one percent of the boys and ninety percent of the girls had already been exposed to agency-sponsored sports (Youth Sports Study, Phase I, 1976).

The traditional position of school officials to oppose athletic competition until the high school years, and then to provide competitive opportunities for only those who possess high levels of skill is an obvious paradox. Parents and athletes alike realize that anyone who relies solely on

school physical education and intramural programs for skill development is not likely to qualify for interscholastic teams.

Currently, much of elementary school physical education is taught by classroom teachers who have no special preparation to teach motor skills. Often, classes in motor skill development are limited to one or two short periods per week. As a result, children reach junior and senior high school without an adequate preparation in the fundamental skills of sports. The tendency to reduce the time devoted to physical education in junior high school, and to make it an elective subject in high school, further reduces the likelihood that students will acquire adequate motor skills in school-sponsored programs.

It is not surprising that parents often support agency-sponsored programs and tend to neglect elementary school physical education, whose primary function is to develop in children the fundamental motor skills that are the basis of games, dances, and sports. The impact of agency-sponsored sports on the competitive experiences of Michigan children was illustrated in the Youth Sports Study. When asked where they first learned to play the sport that they represented in the sample, only twelve percent of the boys and sixteen percent of the girls indicated that this exposure occurred through school physical education, intramural, or interscholastic experiences. The majority of boys and girls were introduced to their sport through recreational or agency-sponsored programs and private lessons (Youth Sports Study, Phase II, 1978).

Discussion about the extent of athletic participation by children and youth should include the degree to which these young athletes remain in the programs and their reasons for leaving them. Is an early age of eligibility related to an early dropout? Patterns of participation across chronological ages indicate that an interest in sports participation is maintained by boys and girls until age twelve or thirteen. At these ages a dramatic reduction in participation takes place. Some attrition is undoubtedly related to an increased intensity of competitiveness that occurs in programs for adolescents. For others, the standard of proficiency required for interscholastic competition becomes the criterion. If their self-assessment indicates that they will not be able to compete successfully at the high school level, they often pursue other interests. Evidence indicated that a decision to continue or drop out of sports is contingent on the social context in which sports are offered. Social implications of sports participation are discussed in the section on "Psychological Effects of Athletic Competition on Children and Youth."

EFFECTS OF SPORTS ON PHYSICAL DEVELOPMENT

It is a fundamental law of nature that terrestrial plants and animals must possess a sufficiently strong structure to bear their weight while engaging in essential life activities. In children, this structure is frequently challenged and sometimes exceeded, particularly in physical activities associated with organized games and competitive sports.

Historically, physicians and educators have supported the notion that exercise is beneficial to physical growth. However, research has provided little evidence on the kinds and amounts of activity in which children and youth must engage to insure optimal physical growth (Espenschade, 1960; Lamb, 1968; Malina, 1969; Rarick, 1973; Lowrey, 1978). Most of the evidence that relates directly to the longitudinal influence of physical stress on growth has been conducted on infrahumans. Research on humans generally has involved ex post facto designs in which the athlete subjects were studied for short periods of time.

Bone, Muscle, and Adipose Tissue

Controversy over beneficial or detrimental effects of physical activity during the growth years has vacillated from concerns that children do not receive enough stimulation to become or remain physically fit, to concerns that certain age-group athletic training procedures are harmful to growing tissues. Both points of view are beset with the problem of detecting when a body moves from normal to abnormal functioning in relation to the activity level to which it is subjected. This problem is compounded by developmental level and sex of the participants.

Some of the best evidence of the positive contributions of physical activity on growth has been inferred from studies of what occurs when activity is withheld through immobilization, bed rest, or denervation. Findings indicate that under these conditions, a skeleton loses mineral content, shows decreased cortical thickness, and grows longer and more linear bones than a skeleton subjected to weight bearing and lateral tensions of muscle contractions. Studies on humans and lower animals have also demonstrated that inactivity leads to an increase in urinary excretions of calcium and nitrogen, and that resumption of activity reverses this process. In general, research on human and infrahuman subjects supports the principle that tensile and compressive forces act as stimulants for bone growth in young people, but that extreme forces create destruction of bone by resorption.

The direct relationship between inactivity and skeletal structure is quite clear in subjects whose activity level has been drastically reduced. Adults who prescribe activity programs for growing children confront the enigma of defining the intensity of exercise that will exceed minimum requirements for normal growth, but not exceed the tolerance of youthful systems at their various developmental stages.

The most direct evidence of physical activity on cell growth occurs in muscle and adipose, or fatty, tissue. The hypertrophy that results from strenuous training has long been recognized, as is apparent by a prevalence of weight training programs in almost all levels and kinds of competitive sport. According to Edgerton (1973), hypertrophy is stimulated by overloading the muscle fiber, thus changing the permeability of the saccolemma (cell

membrane) and providing greater access to amino acids, which permit protein synthesis. During vigorous training programs, lean body mass increases at the expense of adipose tissue, a point that is well established and requires no further elaboration here.

The preventative influence of activity on adipose tissue accumulation also has been convincingly established. Recent studies suggest that obesity originates in intrauterine life or infancy, although the stimuli for obesity have not been clearly identified (Hirsch and Knittle, 1970). It is clear that individuals who combine inactivity and abundant nutrition will probably be overweight, whereas individuals who maintain a vigorous exercise program will have a low proportion of fat to muscle mass.

In Summary. Changes in muscle and adipose tissue that result from specific activity programs are much easier to produce and assess than possible changes to skeletal structure. Abundant evidence shows that adipose tissue in both males and females can be markedly reduced through exercise regimens. Likewise, an increase in muscle mass from weight training programs that operate on an overload principle is commonly found among adult males. The absolute increase in muscle mass (not the proportion of lean body mass) in females of all ages and in males prior to puberty as a result of various body-building techniques is not well documented. Body building is regarded by many as a dubious undertaking in young males because of the inefficiency of incorporating protein into muscle tissue prior to puberty. In addition, the repetitive overloading of joint structures could have detrimental effects on the epiphyseal cartilages, as in children these seem to be more vulnerable to stresses than muscles or bones.

General Physical Growth

The influence of strenuous activity programs on the overall growth and structural changes of young athletes is not clear, because most of the reported studies did not control for the confounding variables of a subject's initial body type and maturational age. Without knowing the growth rate before the initiation of a study, it is impossible to attribute changes in size during the study to the influence of physical exercise.

Some fragmentary evidence on human subjects shows that training programs of moderate intensity accelerate growth in stature and body size (Adams, 1965, 1966; Astrand et al., 1963; Ekblom, 1969; Schwartz, Britten, and Thompson, 1969), and alter the proportions of the skeleton (Parizkova, 1968). Of the first four studies, only Ekblom accounted for the possibility of varying body types and biological ages in his subjects by randomly assigning them to training and control groups. Ekblom concluded that the subjects who trained for thirty-two months (between the ages of eleven and fourteen years) had greater increments in height and weight during this time than their counterparts in a control group.

A study in which the effect of physical activity on growth has frequently been misinterpreted was published by Astrand and co-workers (1963), who reported that a population of champion Swedish girl swimmers were taller than their peer group of girls. Scrutiny of their data showed that the difference was present at seven years of age, before most of the girls engaged in competitive swimming programs. Astrand's data suggested that the girls gravitated to swimming because of preexisting characteristics or family influence, not that the intensity and duration of training accelerated their

growth in height. The fact that Astrand noted no detrimental influence of stressful activity on growth may be attributable to the activity chosen for investigation. Swimming does not involve direct weight bearing by the long bones and hence would be less likely to interfere with linear growth.

Parizkova (1968) studied the longitudinal growth patterns of four groups of boys who were categorized according to their activity level. The five-year longitudinal study (ages eleven to fifteen) revealed no significant changes between the groups in height, weight, and biological maturity level, but the groups that engaged in the most strenuous activity programs had significantly wider shoulders in relation to their hips than less active groups. Parizkova attributed the change to a difference in hip width that resulted from the difference in activity levels between the groups. Theoretically, the contractile force of the muscles in the lower extremities caused a narrower pelvis to develop in the most active boys.

Adams (1965, 1966) reported specific effects of a stressful, repetitive activity on growing structures. He noted accelerated growth at both the elbow and shoulder joints of Little League Baseball pitchers; these changes occurred only in the joints of the throwing arm and, therefore, were attributed to the stresses of throwing a baseball.

Several investigators have reported data that showed a reduced growth rate in the heights and weights of athletes during moderate to intensive activity programs. These data should be interpreted with the caveat that no attempt was made to equate the athletes with their control groups on the basis of biological age. Thus, the differential effects of early or late maturity, rather than the influence of the training programs, may have led to the differences in growth between the groups. Rowe (1933) reported smaller mean gains in height and weight for four groups of athletes, each matched by height and weight with a control group of nonathletes at the beginning of the studies, which ranged from three months to three years.

The differential effects of multiple-sport participation on height and weight were investigated by Shuck (1962). He reported that ninth grade boys who participated in only one sport had greater increments of height and weight than those who participated in multiple interschool sports. However, the reverse was true at the seventh and eighth grades. A possible explanation for these results is that the increments of growth for seventh and eighth grade boys are not likely to be as large as those in the ninth grade boys and, thus, would not be as greatly affected by stressful physical events.

Two reports suggested that wrestling may curtail physical growth. Training programs in wrestling are of particular interest because the activity is unusually strenuous, and performers are frequently asked to refrain from their normal caloric intake. Thus, young wrestlers may be subjected to several stressors that influence growth. Clarke (1974) reported that the wrestlers in his study made no significant gains in standing height during the course of a season, and Tipton and Tcheng's (1970) group of high school wrestlers showed a mean gain in standing height of only 1.5 cm. over a six-month period. These data are of particular interest when one considers that the annual mean gain in standing height for boys between the ages of thirteen and seventeen years is seven cm., with many showing increments of ten to twelve cm. during the year of peak height velocity. This figure is not a true representation of actual growth, however, as individual patterns indicate that annual increments of ten to twelve cm. are not uncommon during the year of peak height velocity, immediately preceded and followed by years when the increment is from seven to eight cm.

When the evidence on apparent curtailment of growth by stressful physical activity is viewed against the model of catch-up growth proposed by Prader, Tanner, and Von Harnack (1963), one must question whether any program that restricts or delays normal growth is in a child or youth's best interest. Prader's model suggested that: (1) The human organism is capable of growing many times faster than its normal rate in an attempt to recover from an unfavorable condition; (2) the degree of recovery is dependent on the extent and duration of the deprivation and the developmental level of the child; and (3) the full genetic potential of the organism will never be realized because the time lost during the deprivation cannot be extended indefinitely.

Injuries Related to Trauma and Repetitive Stress

Although the beneficial effects of activity are important to parents, educators, and the medical profession, it is the potential detrimental influences of sports on children's growth and development that have generated the greatest interest and controversy. Rarick (1973) grouped these hazards as follows: (1) The physical demands and psychological stresses of highly competitive athletics may be great enough to adversely affect growth and development; (2) repeated stress from a particular movement peculiar to a sport may be sufficiently great to induce trauma to a body part, thus impairing its normal growth; and (3) a blow or forceful impact may be sufficiently great to permanently damage a growing structure, or to be fatal.

Although information on the relationship of sports programs and the three categories of hazards is incomplete, increasing evidence does provide the possibility for making prudent judgments about the intensity of training regimens in which children engage. However, the expertise required to prescribe individualized activity programs is so difficult to obtain that most athletic coaches, especially those who volunteer their services to youth sports programs, may never be able to achieve this level of sophistication. After reviewing the problem, Rarick (1978) concluded that perhaps the most practical solution would be to provide general guidelines on designing activity programs for young participants.

Among the most vulnerable parts of a growing body to physical stresses are the joints of the elbow, shoulder, knee, and ankle. Numerous medical authorities have suggested that the epiphyses of young athletes are the most susceptible to injury, because the ligaments and fibrous capsules that surround the joints are more resistant than the epiphyses to the twisting and shearing forces to which they are subjected (Larson and McMahan, 1966; Sigmond, 1960).

Medical records and statistics on injury incidence provided by league officials suggest that the problem is not as great as opponents of youth sports programs have implied. Larson and McMahan (1966) noted that of 1,338 athletic injuries treated by four orthopedists over a ten-year period, only twenty percent occurred in athletes who were fourteen years and under. Of these, only 1.7 percent involved the epiphyses. Hale (1961) reported that of over five million Little League Baseball players, only two percent received injuries that required medical attention. Of these, nineteen percent were fractures and eighteen percent were sprains. None of the other categories involved injuries to the joints of the long bones.

Three reports suggested that the incidence of athletic injuries are related to specific sports and the conditions under which the sports are conducted. Adams' (1965) report of the trauma inflicted on the elbows and

shoulders of young baseball players underscores the vulnerability of the epiphyseal areas to injury when stresses are repetitive. Adams noted varying degrees of epiphysitis, osteochondritis, accelerated growth, and separation of the medical epicondyles in seventy-six of the eighty pitchers, while damage to joints was present in only seven of the forty-seven nonpitchers.

In contrast, Torg, Pollack, and Sweterlitsch (1972) noted that none of the forty-nine baseball pitchers in their study had abnormalities of the shoulder structure, and only three had evidence of irregular development of the elbow joint. Torg et al. attributed the difference in incidence of injury between the two reports to the circumstances under which the two groups participated. The former situation was highly competitive and encompassed an extensive playing schedule, while the latter emphasized participation for recreation.

Despite the concern of educators and physicians about the involvement of growing youths in sports that promote bodily contact or collisions, there is little evidence that these sports (for example, ice hockey and tackle football) have a higher incidence of injuries, or that the injuries are more severe than those sustained in other organized youth sports or informal sandlot play. The 11.2 percent of injuries sustained by junior high school football players, as reported by Emerson (1964), suggested that the potential for injuries is present among young players, even though data on the incidence of injuries suggest that they occur in direct relation to the age of the participant. Apparently, the ability to produce force, whether it is used to deliver a blow to an opponent or to create forces within an athlete's body that result in self-sustained ruptures to muscle and ligaments, is the primary cause of most athletic injuries.

In Summary. The lack of reported injuries in youth sports programs is no indication that they do not exist. Most of the available data on training effects were accumulated years ago, when conditioning programs were not as intensive as they are now. In addition, many programs now are yearlong, whereas formerly they were seasonal. Another reason for the low recorded frequency of injuries in youth sports programs may be poor accounting systems. A systematic, uniform injury recording procedure would provide meaningful data on a potentially critical problem. A third reason is that the greatest danger of youth sports injuries may be their chronic and latent effects. Injuries that may not cause termination in participation, or even come to the attention of a physician, may be troublesome in later life. Although Larson and McMahan (1966) and Simond (1960) suggested that bone and joint injuries of young athletes heal promptly if properly treated, earlier Lowman (1952) held that it is not the detectable injuries such as fractures, dislocations, sprains, strains and abrasions, but the minute, day-to-day trauma of stressful exercise that results in body misalignment and arthritic conditions so prevalent in middle-aged populations.

Biological Maturation

An understanding of biological maturation is of primary importance in a discussion of age-group sports competition, because of the differences of physical activity on human tissues at various stages of growth. Changes in the quantity and quality of nervous, muscle, bone, and adipose tissues are directly related to the functional capacity of individuals to perform motor skills. The rate at which body cells mature is an individual process that is

only remotely related to chronological age. Hence, when abilities are a direct reflection of developmental level, other measures more appropriate than chronological age should be used in equating skill levels.

The distinction between chronological and biological age was recognized long before the practice of athletic competition for youth reached its popularity in the United States. In 1908, Crampton noted the advantages of grouping children for educational purposes on the basis of "physiological age." Concurrently, Rotch wrote,

> When . . . the question of age is brought to bear on our school systems, whether in classifying and grading children as to their studies, or in pitting them against each other in athletic sports, it becomes a very serious question as to whether chronological age is a wise decision during the formative period of early life. (1908, p. 1197)

Krogman (1972) compared chronological and biological age to a foot race in which the contestants all began at the same time, but each crossed the finish line according to individual genetic endowment. To illustrate, he provided the following five divisions of childhood: chronological age, biologic or organic age, behavioral or emotional age, intellectual or mental age, and self-concept age. The advantage of Krogman's childhood ages (other than chronological age) is that they provide a measure of the variability between individuals of the same chronological age.

Because of a high positive correlation between body size and motor prowess in young athletes, the variability of certain parameters within a chronological age group is of considerable interest. Data taken from growth charts published by the American Medical Association (1967) illustrate the point. For example, the standing height of normal boys at fourteen chronological years ranged from fifty-five inches to seventy-two inches, when the sample included plus and minus three standard deviations from the mean height. In weight, the heaviest boys at age fourteen within the normal range were 180 pounds, while the lightest weighed only 70 pounds. In girls the greatest variation within a chronological year occurred at age twelve, when the shortest and tallest girls were fifty-two and sixty-six inches, respectively. In weight, the normal values ranged from 58 pounds to 140 pounds.

Variation in biological age for a specific chronological age is as astounding as the height and weight differences. Skeletal ages for girls at twelve chronological years ranged from 165 months for the earliest maturing to 124 months for those who matured later. Skeletal ages for boys who were fourteen chronological years ranged from 188 months for the early maturing individuals to 146 months for late maturers. At fourteen years of chronological age, the difference between the earliest maturing girls (who were 212 months) and the latest maturing boys (who were 146 months) in terms of skeletal age was 76 months. These examples illustrate that a specific chronological age is likely to encompass individuals whose size and biological maturity are similar to the averages of children who are two and three years younger and older than the mean for their chronological age.

The close association between skeletal age, height, weight, and motor development indicates that more mature children within an age group have an advantage in sports competition. Although the selection process for team membership is not well documented, reports on biological ages of successful performers confirm this hypothesis. Krogman (1959) noted that in his sample

of the fifty-five boys who participated in the 1955 Little League World Series, seventy-one percent had skeletal ages greater than their chronological ages; twenty-five boys had skeletal ages that exceeded their chronological ages by more than one full year. Krogman suggested that the baseball players in his sample were successful because they were "more mature, biologically more stable, and structurally and functionally more advanced."

Hale (1956) reported that 45.5 percent of the boys who participated in the 1955 Little League World Series were post-pubescent in terms of secondary sex characteristics. Most of the important offensive and defensive positions (clean-up hitter, pitcher, first base, and left field) were filled by post-pubescent boys.

Two later studies also verify the effect of skeletal age on performance. Rochelle, Kalliher, and Thornton (1961) noted that seventy-one percent of the boys in their sample of junior high school tackle football players had skeletal ages in advance of their chronological ages. Similarly, Cummins, Garand, and Borysk (1972) found that boys and girls at a summer camp for track and field athletes were advanced in skeletal age. Of greater interest is that skeletal age for boys was a better predictor of success in most events than height, weight, and chronological age, singularly or in combination. In this situation, advanced biological maturity, although highly correlated with height and weight, accounted for a significant part of the variance that was unexplained when a measure of maturity was excluded from the equation.

The association between skeletal age and body size in growing children is well documented. Scientists in the area of human development such as Boas (1932), Flory (1936), Greulich (1938), Richey (1937), Shuttleworth (1937), Simmons and Todd (1938) reported that boys and girls with advanced skeletal ages were also the tallest and heaviest children in their chronological age groups. Crampton (1908) noted that post-pubescent boys of thirteen and fourteen years were thirty-three percent heavier and ten percent taller than pre-pubescent boys who were several years older. These associations between the heights and weights of early and later maturing individuals have since been corroborated by other investigators.

Relationships between the various indicators of maturity, commonly classified as primary and secondary sex characteristics, are modest to high, depending on whether an individual matures early or late. As might be expected, the relationship between skeletal age and the primary and secondary sex characteristics is also in the modest to high range. Thus, if skeletal age has high positive relationships with height, weight, breadth, circumference, and with the primary and secondary sex characteristics, why is it not used more often as a means of classifying children for motor skills?

Espenschade (1940) reported correlations ranging from +.14 to -.26 between motor performance tests and skeletal age for girls, while correlations between skeletal age and motor performance for boys ranged between +.22 and +.56. Partial correlations, to eliminate the effect of chronological age, resulted in slightly higher negative correlations for the girls and reduced the positive correlations between skeletal age and motor performance for the boys. With chronological age eliminated, the relationship between skeletal age and motor performance ranged between +.08 and +.04. Espenschade concluded that skeletal age added little to the prediction of motor performance that could not be obtained from a combination of height, weight, and chronological age.

The relationships between body size, skeletal age, and motor performance reported by Espenschade were supported by several investigators. Rarick and Oyster (1964) found that skeletal age added little to the prediction of motor

performance in eight- and nine-year-old boys when height and weight preceded skeletal age in a step-regression equation. Findings similar to those of Rarick and Oyster occurred when data from nine- to twelve-year-old boys of the Motor Performance Study were analyzed for relationships between motor skills, physical size, and skeletal age (Howell, 1979). These studies suggested that the effect of biological age on specific sports skills may be cumulative, with its greater impact coming during the period between eleven and fifteen years when the greatest variation exists between athletes of the same chronological age.

It is logical to assume that skeletal age would facilitate motor performance, because of the greater breadth of structure and length of levers in more mature performers. This assumption seems to be supported in the data for the boys, but not for the girls. In explanation, Espenschade suggested that the negative relationship between motor performance and skeletal age in girls may be due to the increased weight of the earlier maturing girls, which proved to be a handicap in motor skills, or that increased age may have led to restricted practice of motor skills because of other social interests. Espenschade's data confirmed that the influence of skeletal age in motor performance differs in boys and girls. However, because skeletal age and body size are closely related, it is difficult to tell whether the differing correlations for boys and girls resulted because the performers were larger or because they were more mature.

The high positive relationship that is commonly found between body size and skeletal age may have resulted in giving undue credit to skeletal age as an influential variable in motor performance. Hale's (1956) report emphasized the physiological maturity of 112 boys who played in the 1955 Little League World Series. Likewise, Krogman's (1959) report did not discuss the heights and weights of the players, and therefore did not estimate their contribution to skill level.

Another example illustrates the confounding effect that the interrelationship of skeletal age and body size may have on the interpretation of motor performance data. Bar-or (1975) attributed the increased swimming ability of the finalists over semifinalists in the Israeli National Championships to the greater biological age of the finalists. Yet the finalists also possessed greater height, lean body mass, and vital capacities than the semifinalists, who had a greater mean chronological age. Again, the dependent contributions of body size and skeletal age were ignored and the difference between performers attributed to their differences in skeletal age.

In Summary. There is little evidence that the kinds and amounts of physical activities in which young athletes engage are detrimental to the growth of bone and muscle tissue. Conversely, activity stimulates bone and muscle development, and retards the deposition of fat through a negative energy balance. It is likely that most activities associated with organized athletics for children have beneficial effects. Where data are lacking, it is prudent to assume that any compulsory activity that results in acute or chronic injury to growing tissues is not in the best interest of a young athlete.

PSYCHOLOGICAL EFFECTS OF ATHLETIC COMPETITION ON CHILDREN AND YOUTH

Although the effects of athletic competition on children's physical growth and development have concerned many people, typically the psychological consequences have caused a greater controversy. Proponents hold that participation has positive effects on the psychological development of a child by instilling leadership qualities, teaching good sportsmanship, and developing desirable personality characteristics. Critics, in contrast, believe that competitive athletics are psychologically detrimental because competition places children under too much emotional stress and teaches them aggression and unsportsmanlike attitudes. Until recently, educators, parents, and adult leaders had to rely on conjecture or personal experience to decide whether participation in competitive athletics had beneficial or detrimental psychological effects. However, scientists have begun to study the psychology of athletic competition, and their research provides some tentative answers.

This section reviews the empirical evidence on the psychological effects of athletic competition on children and youth, and derives from it some practical advice for those interested in youth sports programs. The review is confined to the areas of competition; socialization; socialization into sport, with particular emphasis on why young athletes participate and discontinue participation; socialization through sports participation, with emphasis on development of sportsmanship; and anxiety resulting from competitive youth sports participation. Only the most pertinent studies in these areas are examined.

Understanding Competition

To understand the consequences of athletic participation on a child, we must examine the process of competition. Among its many definitions, the most widely accepted is that of the social evaluation theorist. In this view, competition is defined as "activities directed more or less consistently toward meeting a standard or achieving a goal in which performance by a person or by his group is compared and evaluated relative to that of selected other persons or groups" (Sherif, 1976, p. 19). The key element in this definition is that a person's competitive behavior "is compared and evaluated by selected other persons or groups," not by everyone or just anyone. The importance of the competitive behavior, the goals and standards of comparison used, and the interpretation of success and failure are determined by the social context in which one competes, that is, by the selected others who evaluate one's performance.

In youth sports, these selected others are typically the teammates, peers, family, and coaches of the athlete. The psychological effects of participation are inherently neither good nor bad (Martens, 1978a); depending on its social context, competition can have beneficial or detrimental consequences.

The influence of social context on a child's competitive behavior was demonstrated in a field experiment conducted by Sherif and Sherif (1969). At a summer camp, these investigators manipulated the social environment of two groups of boys to create a totally competitive, win-at-all-costs atmosphere. The result was extreme prejudice and hostility between the groups in all camp activities, from athletic competitions to mealtime behavior. After a

prolonged period of intense competition, the camp staff induced--through concentrated effort and use of superordinate goals (goals highly desired by each group, but unattainable without cooperation)--a cooperative, nonhostile atmosphere between the two groups. By manipulating the boy's social environment, that is, by creating an atmosphere conducive to intense competition or cooperation, the investigators found that the importance of competition and its consequences can be greatly influenced.

In Summary. To fully understand the beneficial psychological consequences of athletic competition on a child, the social environment in which children compete and the factors affecting this milieu must be examined.

Socialization

Socialization is a process whereby individuals learn the skills, attitudes, values, and behaviors that enable them to function in a group or culture. Children learn the accepted ways of their group or culture via social learning. Agencies such as the family, the school, the church, and the mass media directly and indirectly teach a variety of skills, knowledge, and dispositions. Children are not equally exposed to the same socialization forces, however, and they differ widely in the beliefs, values, attitudes, and skills they deem important.

Traditionally in our society, males have been socialized to believe that sports participation and achievement are highly valued commodities, whereas females have been socialized to place less emphasis on athletic achievement and participation. In an extensive study of adolescent boys, Sherif (1976) found that most American boys were socialized to highly value athletic endeavors, whereas Mexican immigrant boys of peasant origin were socialized to show little interest in sports. The socialization process can have a dramatic impact on interest in sports.

In examining sports socialization, two general areas emerge: socialization into sports and socialization through sports. Socialization into sports refers to how individuals formally or informally learn to value and become involved in specific sport roles, such as athlete, coach, and spectator. Socialization through sports refers to "the more general attitudes, values, skills and dispositions such as sportsmanship, character or citizenship which may or may not be acquired while playing specific sport roles such as the Little League athlete" (McPherson, 1978, p. 222). The role that athletic participation plays in personality and social development, for example, would fall in the socialization through sport domain.

Socialization Into Sports

Children are socialized into sports from birth, with differences depending on sex, religion, race, and socioeconomic background. Of these, the sex of a child has been found to be an important determinant of differential sport role socialization (Greendorfer, 1977; Lewko and Greendorfer, 1978; McPherson, 1978). It is common, for example, to see a father rush to the delivery room with a miniature baseball glove or football uniform for his newborn son, in contrast to the doll he brings for his daughter. Mothers also convey sex roles to their offspring at early ages. Goldberg and Lewis (1969) found that as early as six months sex differences are evident in the ways

mothers treat their children. Mothers touched, handled, and talked to their daughters more than their sons, but allowed their sons to engage in more exploratory, independent, and vigorous play.

Over time, these subtle differences in parental treatment and expectations influence children, who learn sex appropriate behaviors. Little boys learn that they are expected to get dirty and play sports, while little girls learn that young ladies should be neat and proper, and not play football. By puberty, adolescents have fairly stable perceptions of the sex appropriateness of certain activities. As Lewko and Greendorfer (1978) noted, "It is not surprising to find differences in athletic participation based on sex."

In phase one of the Youth Sports Study (1976) in Michigan, it was found that one out of four males participated in and completed a season in baseball, while one out of ten females indicated that they did so. Differences in socialization and perceived sex appropriateness of sports may be one reason for a large drop in rate by females (Lewko and Greendorfer, 1978). It has also been found that not only parents, but also peers, teachers, and coaches influence a child's perception of appropriate sex and sport roles (Snyder and Spreitzer, 1976; Greendorfer and Lewko, 1978). Although perceptions of sex appropriateness of sports participation are changing considerably, parents, teachers, and coaches must be cognizant of differential sex role socialization, and be especially supportive of athletic participation by young females.

Of recent interest and closely associated with socialization into sport is why children both participate and discontinue participation in organized sports programs. It is estimated that nearly seventeen million American children participate in organized nonschool athletic programs (Martens, 1978a). It has also been found that most sports show an increase in participation up to the ages of eleven, twelve, and thirteen, after which there is a progressive decline in participation (Youth Sports Study, Phase I, 197).

Although researchers have only begun to examine why children participate and discontinue their participation in youth sports, important findings have emerged. Alderman and Wood (1976) found that young Canadian athletes eleven to eighteen years old most often participated in sports to fulfill incentives of "affiliation" and "excellence." The two most popular reasons for sports participation reported by these athletes were to make new friends or maintain existing friendships and to achieve a high level of personal skill. A third incentive was stress or excitement seeking. These incentives were the same regardless of the respondent's age, sport, or sex. In an extensive survey of young Michigan athletes, Sapp and Haubenstricker (1978) found that more than ninety percent of the twelve- to seventeen-year-old boys and girls in the sample reported that they participated for fun, eighty percent to improve their sports skills, and fifty-six percent for fitness benefits.

From these studies, it appears that the major incentives for children's participation are: to have fun, to improve skills, to be with friends, to feel stress and excitement, and to become physically fit. These preliminary findings have important implications for anyone working with young athletes. Specifically, youth sports should be "fun," along with providing ample opportunities for skill improvement and testing for all the participants. Practices and games should be social events, practice activities should be varied to create excitement and reduce boredom, and opportunities for fitness testing and development should be available.

Regarding the question of why children discontinue their participation in youth sports, Sapp and Haubenstricker (1978) reported that from their

sample more than thirty-five percent indicated that they would not participate the following season. On the multiple-response questionnaire, sixty-four percent of those indicating their intention to discontinue participation did so because they would be involved in other activities, forty-four percent because they would be working, thirty-four percent because they were no longer interested in competing, fifteen percent because they did not play enough, thirteen percent because they did not like the coach, and ten percent because it was too expensive.

In interviews with sixty cross-country skiing, hockey, soccer, baseball, and swimming dropouts, Orlick and Botterill (1975) found that sixty-five percent quit for reasons related to emphasis on winning. Of these, half indicated that they discontinued play because of an overemphasis on winning. Of further interest was the finding that sixty percent of the dropouts of high school age did so because of conflicts of interest, while forty percent of the elementary school children dropped out because they did not play and the remaining sixty percent because they were unsuccessful.

Although youth sport coaches and leaders can do little to control children's discontinued participation resulting from their interest in other activities or work, the findings that many children stop participating because of overemphasis on winning, lack of fun, lack of success, and lack of playing time are especially noteworthy. These reasons are directly related to how athletic programs are conducted. Winning, it must be remembered, is not the fundamental objective of participation for most young athletes. In two studies (Orlick and Botterill, 1975; Griffin, 1978), more than ninety percent of young athletes reported that they would rather play on a losing team and play, than "sit the bench" on a winning team. In the heat of competition, coaches may do well to remember this finding. The successful coach keeps winning in perspective and sets realistic goals for children that emphasize fun and participation.

Closely associated with the examining of reasons for children's discontinuation of youth sports participation is the questioning of using extrinsic rewards to motivate young athletes. Several authors (Thomas, 1978; Roberts, 1976; Martens, 1978b) have suggested that giving children recognition and rewards--trophies, all-star berths, and jackets--for highly desirable activities such as sports will undermine their intrinsic interest in the activity. It has been suggested further that when the rewards are no longer available, the participants will no longer engage in the activity.

Should rewards be given to young athletes engaged in sports, or will these rewards undermine a young athlete's intrinsic motivation and result in discontinued participation? Research has shown that the answer to these questions is simply not a matter of giving or not giving rewards (Halliwell, 1978). Instead, evidence shows that extrinsic rewards may increase or decrease intrinsic motivation.

First, extrinsic reward undermines intrinsic motivation when it causes a recipient to change his or her perceived locus of causality from internal to external. That is, when a player perceives a reward to control his or her participation (external locus of control), as opposed to a player who participates out of self-interest (internal locus of control), intrinsic motivation is undermined. External locus of control can include all sorts of rewards, from trophies to pleasing one's parents.

Second, extrinsic rewards can affect intrinsic motivation by conveying information about self-competence and self-worth. If a reward causes a participant to feel greater personal worth and more competence, it will increase intrinsic motivation. If a reward gives no information about

self-worth or competence, or decreases a person's self-worth or competence, it will decrease intrinsic motivation. Consequently, rewards should be contingent on criteria such as performance and effort.

It would seem that because most rewards in children's athletics are contingent on performance (placing first, second, or third; won-loss record), rewards would never undermine intrinsic motivation. They convey information about self-worth or competence. Halliwell, however, indicated that

> even though the informational aspects of the trophies may provide the athlete with a sense of personal competence, the controlling aspect of these rewards may be more salient than the informational dimension if the reward recipient perceives that his sports involvement is controlled by the pursuit of trophies and other tangible rewards. (1978, p. 70)

Instead of increasing an athlete's intrinsic motivation, rewards might undermine interest by making the participant view the sport as a means to an end. The locus of causality for the player's behavior becomes external.

Youth sports coaches and leaders should be careful about using extrinsic rewards. These should be inexpensive, and used to reflect improvements in personal competence, not to control or coerce children to participate in desirable activities.

In Summary. Socialization agents including parents and coaches assume such vital roles in determining how children perceive rewards, these persons must keep winning in perspective and stress the nontangible values of sports participation, as opposed to extrinsic rewards.

Socialization Through Sports

A recent survey of nonschool youth sport coaches revealed that they stressed socialization through sport as a primary objective of youth sports participation (Martens and Gould, 1979). Moreover, nonschool sport coaches, administrators, and parents have indicated that they strongly agree with statements such as "participants learn to respect the rights of others," "participation prepares a child for adult life," and "participation develops sportsmanship" (Youth Sports Study, Phase III, 1978; Gould and Martens, 1979). Although it is a common belief that participation in competitive youth sports develops character and instills the moral ideals of the culture, research has not substantiated this claim. McAfee (1955) and Kistler (1957) found that as boys became older and more involved in sports, their attitudes towards sportsmanship became poorer. Similarly, in a series of studies examining aggression in youth hockey, M. Smith (1974, 1975, 1978) found that aggression in a negative sense is learned through hockey participation, and that the more experience a child gets, the greater the likelihood of learning aggressive tactics. Smith (1978) further contended that aggressive acts are learned in hockey because aggression is socially sanctioned normative behavior that is learned from observing professional players, and reinforced by significant others in youth programs.

Martens (1978b) and Chissom (1978) took a more optimistic point of view in suggesting that sports participation has a potential for fostering positive moral development in children. Martens indicated that

> asking whether sport creates sinners or saints . . . is asking a moot question. The obvious answer is that youth sports programs can facilitate moral development when conducted correctly and also can facilitate the development of immoral or amoral behavior when conducted incorrectly. The more pregnant questions are, "What experiences in youth sports enhance moral development?" and "What experiences contribute to immoral development?" (1978b, p. 202)

Significant others and the social context in which a child competes determine the answers to these questions.

Young athletes learn moral and immoral behavior, or what behaviors are judged to be right and wrong by a group or society, through modeling and reinforcement. For example, children may see a highly successful professional athlete demonstrate unsportsmanlike behavior and try to emulate their hero or heroine. If they are reinforced for exhibiting these behaviors, it is probable that they will learn the undesirable social behavior. In contrast, if socialization agents model moral, sportsmanlike behaviors and children are reinforced for exhibiting these behaviors, they are likely to learn good sportsmanship. Thus, if a coach explains to the athletes why they should exhibit sportsmanlike behaviors, models these behaviors, reinforces them and withdraws rewards for unsportsmanlike behaviors (for example, removes the player from the game if he or she acts in an unsportsmanlike manner), it is probable that the player will acquire good sportsmanship.

Instilling moral behaviors involves more than simple modeling and reinforcement. Significant others must be consistent. For example, if a coach explains to the athletes why they should not argue with officials and praises them for not arguing with officials, but the coach argues with officials, then the athletes will not learn good sportsmanship. Instead they learn that it's permissible for adults to argue, but not children. Because actions speak louder than words, coaches and parents should strive to be consistent in what they say and do. They must also be consistent when withdrawing rewards or penalizing unsportsmanlike behavior. Participants will not learn moral behavior unless all players, regardless of their ability, abide by the moral system. If an unskilled athlete demonstrates unsportsmanlike behavior and as a result is removed from the game by the coach, the same should occur if the star athlete demonstrates similar behavior.

It is important that coaches, parents, and adult leaders not only model and reinforce sportsmanlike behavior consistently, but also explain to the players why they should act in such ways. These explanations are important for moral development, as young children seldom show concern for the intent of acts, or put themselves in the place of whomever is the target of the aggression or unsportsmanlike conduct.

In Summary. Both moral and immoral behavior can be learned in youth sports. Which of these is learned depends to a large extent on the social context of the competition. If sportsmanship is to be learned, coaches, parents, and adult leaders must be consistent in modeling pro-social behaviors, reinforce these behaviors, penalize inappropriate behaviors, and explain to the children why they should act in a sportsmanlike manner.

Anxiety Resulting From Competitive Youth Sports Participation

For years critics of organized youth athletics have contended that participation places children under too much emotional stress. Proponents contend that participation in competitive youth sports is no more stressful than participation in other nonsport activities--band, school, testing. To date, only several researchers have worked on this issue. Their results, while not conclusive, provide a better understanding of the sources of anxiety related to competitive athletics for children, and some tentative answers.

Before the research in this area can be examined, however, the term anxiety must be defined. Anxiety is a familiar word, but it can be confusing because it is used in several different ways. Sometimes anxiety is used to indicate how much nervousness, apprehension, and/or tension a person feels at a particular moment in time. This is called state anxiety. At other times, anxiety is used to refer to a personality disposition that causes a person to perceive evaluative situations, such as sports competition, as threatening or nonthreatening, and to respond with varying levels of apprehension or tension. This is trait anxiety. A high trait-anxious person typically views evaluative situations as threatening and usually gets quite nervous and tense. In contrast, a low trait-anxious person typically views evaluative situations as less threatening and usually does not become nervous or tense. Both kinds of anxiety are important in competitive situations and have been studied by sports psychologists.

Skubic (1955) first examined the anxiety issue by measuring the emotional responses of boys involved in Little and Middle League Baseball competition. Galvanic skin response was used to measure the boys' state anxiety in pre- and post-game situations, and in required school physical education competition. The results revealed that the competitive baseball game provoked no more anxiety than the physical education class. However, when pre- and post-game measures were compared, the players showed greater post-game state anxiety.

In another study conducted with Little League Baseball players, Hanson (1967) measured state anxiety by continuously monitoring each player's heart rate with a telemeter. The results showed that the players' average heart rate before the game was 95 beats per minute, it rose to 127 beats per minute when they were in the field, and to 167 beats per minute while at bat. The boys responded with the greatest anxiety at bat when evaluation potential was at its height. After the game, the average heart rate dropped to 110 beats per minute, still higher than the pre-game rate.

More extensive tests of children's emotional responses to competition were conducted in two recent studies (Scanlan and Passer, 1978, 1979; Simon and Martens, 1979). Scanlan and Passer examined the relationships between competitive trait anxiety, playing ability, game importance, team expectancy, self-expectancy, and pre- and post-game state anxiety of 205 soccer players, ages ten to twelve. Their findings revealed that

> sport competition can be perceived as threatening or an anxiety-inducing experience by some children and under some circumstances . . . . Players who were high competitive trait anxious, who had low self-esteem, and who had low performance expectations experienced greater perceived threat and experienced higher state anxiety when facing a pending competition than did those who were low competitive trait anxious, who had high self-esteem, and who had high performance expectancies. (Scanlan and Passer, 1978, p. 199)

In addition, it was found that game outcome--winning or losing--was the most powerful predictor of post-game anxiety, with losers reporting significantly higher state anxiety levels than winners. Most noteworthy was the finding that children who experienced more fun and satisfaction during the game were less anxious. Thus, while competition did not elevate the anxiety of every boy, certain boys under certain conditions were influenced.

In the other study, Simon and Martens (1979) measured the state anxiety of more than 700 boys ranging in age from nine to fourteen and participating in one of seven nonschool sports (baseball, basketball, football, gymnastics, hockey, swimming, and wrestling), two nonsport activities (band solos, band competitions), or two school activities (academic test, physical education class competition). They found that the state anxiety of children engaged in sports was no greater than the state anxiety of those engaged in other activities. In fact, the band soloists demonstrated higher state anxiety than the athletes. Comparing the seven different sports, children engaged in individual sports experienced greater state anxiety than those in team sports. The investigators speculated that the higher anxiety levels associated with individual activities were caused by the greater potential evaluation and/or greater importance attached to the event.

Several important implications can be derived from these initial studies. First, the emotional stress placed on young athletes is probably not as great as critics suggest, since most of the studies have not found significant group differences in state anxiety on pre- and post-game measures. In addition, Skubic (1955) and Simon and Martens (1979) both found that children participating in sports did not differ in anxiety from children in other competitive activities. However, it is important to recognize the finding that competitive anxiety is a problem in certain situations for some youngsters. Scanlan and Passer (1978) and Simon and Martens identified a number of situational and interpersonal variables that seem to be related to elevations in children's anxiety. Specifically, children with low self-esteems and low performance expectations who were placed in highly evaluative situations reported higher anxiety levels. Therefore, attempts should be made to reduce excess evaluation of children in competitive sports, especially for those who are inexperienced, have low self-esteems and/or low expectations. Martens (1978a) suggested that uncertainties about the outcome of competition, about making the team, and about one's abilities, as well as the importance that significant others place on competition, heighten anxiety. Consequently, parents, coaches, and adult leaders should be aware of and sensitive to their actions that may increase the uncertainty and the importance placed on children in the competitive situation.

In summary. Two major conclusions can be drawn from the research reviewed in this section. First, the psychological effects that participation in competitive youth sports has on the child are not inherently good or inherently bad. Rather, the social context in which the child competes determines to a large degree whether positive or negative effects are derived. Second, the significant others in any youth sports environment are of primary importance in determining whether the competitive situation is positive or negative. The behavior of parents and the quality of adult leadership have tremendous influence on a child.

UNRESOLVED PROBLEMS IN YOUTH ATHLETIC COMPETITION

The history of athletic competition for children is filled with controversy, and the debate about the beneficial or detrimental effects of sports continues. Much of the controversy is related to the incongruence between the expectations of children and the demands of adults who control and supervise the competition. Failure of adults to understand the ramifications when variations in body size, maturation, experience, and motivation are ignored has led to problems that might otherwise have been avoided. An understanding of the interrelationships between physical, motor, and social development is essential if the adults who supervise children's programs are to provide experiences that focus on individual development. If sports programs are to benefit all children, they must accommodate a variety of skill levels rather than eliminate or exclude those who do not possess certain competencies.

The essence of sports for children is a nonthreatening environment in which they can learn fundamental motor skills at a rate that is based on individual abilities. Yet the manner in which youth sports are conducted frequently contradicts sound educational practices, as viewed by a majority of parents, coaches, and physicians. What are some of the problems that pervade sports and why are they so difficult to overcome? The answers are related to some long-standing traditions in sports programs. This section discusses the problems associated with the exclusion and retention of athletes, alternatives to highly competitive programs, and acquisition and education of adult leaders. Each subsection concludes with suggested solutions.

Exclusion and Retention of Athletes

The phenomenon of excluding and eliminating individuals or teams is inherent in competitive athletics. The concept of "winning" in American culture implies that the victors have an opportunity to seek additional challenges until they, too, join the ranks of the vanquished or claim the ultimate victory.

Although this model of competition is uniformly practiced and accepted throughout amateur and professional athletics, it is apparent that exclusion or elimination is in direct conflict with one of the goals of most youth sports programs; that is, to gain proficiency in motor and social skills through participation. Proponents of youth sports programs have argued that the exclusion of participants takes place only after all have had an opportunity to engage in a specified number of contests. However, the process of elimination is in effect from the onset if the criterion for individual or team membership is based on a certain entry level of motor proficiency. In these situations, aspiring athletes who do not possess certain skills are excluded after a brief tryout.

Chronological age is still used as the primary criterion for eligibility in children's sports programs. The injustice of this long-standing practice of grouping early and late maturing competitors together is evident to all who have observed children in adult-supervised competition. Aspirants to athletic competition usually are eliminated because they failed to meet certain standards of motor performance. Generally, this failure is attributed to a

lack of strength, power, endurance, or coordination, but the ultimate cause may have been the size and maturity level of the performer.

The process of excluding children from team or individual games and sports is likely to have far-reaching consequences (Orlick, 1974). Exclusion or elimination from sports often reduces or removes further opportunities for a child to practice athletic skills in their usual setting, while children who are retained as competitors benefit from systematic practices under guided instruction. These circumstances are likely to increase the differential between unskilled and highly skilled athletes, which makes it more difficult in later years for those who were excluded to reach the skill achievement level of their peers. Repetition of these events at an impressionable age may discourage a child from making further attempts to become involved in sports programs.

Efforts to identify potential athletes during their childhood, with the idea of grooming them to stardom, is also a dubious practice. Aside from ethical problems, such ventures will likely result in a low proportion of successes. The characteristics that determine athletic prowess are numerous, and many of them have an environmental, rather than a genetic, origin. Moreover, the athletic status of individuals is likely to change markedly between childhood and adolescence. Clarke (1974) reported that among boys who were rated by their coaches as outstanding at some time between nine and fifteen years, only twenty-five percent received this rating at both the elementary and junior high school levels. Forty-five percent were rated as outstanding in elementary school, but not in junior high school; thirty percent were rated outstanding in junior high school, but not in elementary school.

In Summary. It is evident that the extreme conditions of overemphasis on athletic competition or the deprivation of opportunity to participate in sports can alter the lives of children in their formative years. The criteria for placing children into competitive teams or groups should be expanded to include skill level, previous experience, and biological maturation. Chronological age ranges should never encompass more than two years for athletes who are under 16 years of age. Although it is generally not feasible, various levels of competition should exist within these two-year age spans so that athletes can choose their competition level. Governing boards should have the prerogative of moving players to higher or lower levels of competition when athletes dominate games or contests at their present classification level.

When the competitive unit involves a team, its members should be placed into groups on the basis of an evaluation system that equates the units within the league. Teams should be assigned en masse to coaches, in lieu of "player auctions," lotteries, and trading and recruiting.

Alternatives to Highly Competitive Athletic Programs

Despite the equivocal nature of the evidence pertaining to the influence of sports on children, sufficient experiential information suggests that some constructive changes should be made in the way programs are conducted. Many of the recommendations that follow have been stated by others (Rarick, 1973; Hurwitz, 1974; Bar-or, 1975; Martens, 1978a). Traditions in sports are difficult to change, but perhaps the reiteration of these suggestions will hasten their implementation. The following procedures are designed to

circumvent problems caused by adults organizing competitive sports for children without adjusting the rules, skill expectations, equipment, and value systems to accommodate the youthful competitors.

The desire of adults to organize competition for children often exceeds the desires or capabilities of the children to perform. For example, how many children younger than ten can: throw a baseball within the strike zone when pitching from forty-five feet; throw from home plate to second base and successfully eliminate a stealing runner; catch a fly ball hit to center field; from the third base throw out a runner heading for first; or strike a pitched ball that has been thrown with a horizontal trajectory? Examples such as these can be identified in most team sports in which competition was designed initially for adults.

A primary objective of sports programs for children should be to teach them fundamental motor skills in a socially constructive environment. Yet, many youth sports programs are conducted by using a professional model as a prototype, with only minor concessions to modifications in rules, field or floor dimensions, and strategy. Needed is an age-by-age analysis of each contestant's motor and cognitive capabilities, with commensurate adjustments in the conditions under which contests are conducted. In this arrangement, pre-entry competencies would be identified, and children would not be permitted or compelled to compete until prerequisite skills and knowledge had been attained. The stipulation of prerequisite standards for skills and knowledge by competitive level would place an emphasis on skill development at the younger ages. The identification of competencies and required levels of proficiency by sport for each age group would provide essential direction to athletes and coaches that is not available in current programs.

The practice of engaging children in sports at an early age, keeping them involved in that sport for the greater portion of each year, and restricting them within that sport to one position or event may produce a few olympic caliber athletes, but it is far more likely to have negative consequences. Children should be encouraged to learn the fundamental skills in a variety of sports, and they should be encouraged to experience the skill and cognitive requirements of many positions within a specific sport. The likelihood of anyone spending an entire competitive lifetime at one position within a sport learned in childhood is remote; but it is likely that children will use some of the skills learned in a variety of sports at a later age as they select activity patterns to suit their avocational needs.

Acquisition of Qualified Adult Leaders

Qualified adult leaders are essential to the success of youth sports programs. Although often implicated as a source of problems, adults are responsible for the many benefits that accrue to the estimated seventeen million young people who engage in agency-sponsored athletics and the six and one-half million who compete annually in interscholastic sports.

Despite the vital role that coaches have in educating young people, little is known about their philosophies, attitudes, education, and sports background. Historically, the concern of parents and administrators has focused on the qualifications of volunteer coaches or coaches of nonschool programs. For various reasons, coaches in school-affiliated programs have not been subjected to the same concerns, probably because they customarily deal with older children and their compulsory education is believed to imbue them with acceptable values and ethics.

Criteria for coaching interscholastic sports have changed drastically in the past five years. Whereas previously it was mandatory in many states to possess a teaching credential and be employed by the school system in which the coaching occurred, now only seven states have this requirement.* In twenty-seven states a coach is required to have a permanent or temporary teaching certificate, while twelve states indicated that certification or employment as a teacher were not required for coaching. If the current trend of waiving or eliminating the educational criteria for coaching interscholastic sports continues, soon coaches of school and nonschool sports will possess similar characteristics.

Who coaches our youth and what problems do they encounter in this process? Two recent studies provide some information about coaches of nonschool sports (Gould and Martens, 1979; Youth Sports Study, Phase III, 1978). The report by Gould and Martens involved 419 coaches of eight sports from the states of Illinois and Missouri, while the Youth Sports Study included 1,209 coaches of thirteen sports in Michigan. Because the results of these studies are in such close agreement, they will be discussed in general terms, without further distinctions between them.

The coaches who responded to the questionnaires did not fit the win-at-all-costs stereotype that is so frequently depicted by the media as being associated with youth sports. Most of the coaches became involved because their children played or because they viewed their expertise as useful to an existing program. Approximately three-fourths received no remuneration for their services. The vast majority were males, with most of the females concentrated in the sports of gymnastics and figure skating. Almost all of the coaches had a high school diploma and over half had attended college.

When asked about their coaching orientation and to select desirable outcomes, the respondents indicated that they were highly favorable about the potential benefits of youth sports programs. They agreed that first priority should be the well-being of the athletes, while enjoyment, improvement of motor skills, and physical fitness ranked high as desirable outcomes. They did not agree that the programs required too much time, that the athletes were stressed too much physically, and that losing was detrimental to the mental health of young athletes. They recognized that problems such as "too much emphasis on winning," "interference by parents," "emotional stress," and "poor officiating" existed, but they viewed these problems as more likely to occur in other programs rather than their own.

Despite their educational backgrounds, many coaches did not have the basic qualifications in first aid, prevention and treatment of injuries, training and conditioning, teaching sports skills, or knowledge of growth and development to ensure the safe, healthful treatment of youthful competitors under their jurisdiction. These shortcomings were recognized. Where asked to indicate the areas in which they desired more information, they selected numerous topics from the sports sciences, rather than restricting their choices to the more practical aspects of teaching motor skills.

Although many of the coaches indicated that they would continue in a similar role the next year, administrators still face a persistent problem of retaining volunteer coaches after their children are no longer involved. In the Michigan study, sixty-five percent of the coaches indicated that they

*These results were obtained by the senior author in a survey conducted in 1979. Replies from authorized representatives of interscholastic programs were received from 45 states.

would discontinue coaching when their child left the program. Other causes for coaching attrition were: too time consuming, loss of interest, conflicts with administrators and league philosophy, lack of support from parents and other adult leaders, and other commitments.

An obvious weakness in youth sports programs is the lack of an educational program to sustain the coaches. Although lack of adequate monetary compensation undoubtedly is partly responsible for recent disinterest in interscholastic coaching, it has little bearing on the attrition in agency-sponsored sports. Half of the reasons for leaving, given by nonschool coaches, were related to the way that programs were conducted. Issues such as lack of support from adult leaders, disagreements about league philosophy, and conflicts with program administrators suggest that poor communication was a major problem. Information reported in phase two of the Michigan Youth Sports Study (1978) indicated that many programs had no written philosophy or objectives. Under such circumstances, disagreements are apt to arise because there is no common operating procedure.

The enthusiastic response of coaches, when given an opportunity to upgrade their skills and knowledges, is a reassuring signal to administrators that educational programs should have positive results. Coaches were aware of their paucity of knowledge in such areas as first aid, training and conditioning, psychology of young athletes, growth and development, and teaching of sports skills. Their willingness to spend time in addition to their coaching duties attests to the commitment they had to youth sports programs.

Hypothetically, educational programs for coaches should provide several benefits: Coaches would feel more confident about their abilities; athletes would receive better instruction; skill and communication levels would improve; and greater numbers of experienced coaches would remain in the programs. Several educational programs for school and nonschool coaches are now being field-tested for effectiveness. The nationwide dilemma of an insufficient number of coaches, coupled with an increasing sensitivity of parents about the rights of athletes to safe, healthful programs, should stimulate further interest in such programs. Optimistically, the ultimate benefactors will be the young athletes for whom the programs were initially organized and maintained.

The importance that qualified adult leadership has on the psychological development of young sports participants was demonstrated recently in an extensive, multiyear field study conducted by Smith, Smoll, Hunt, Curtis, and Coppel (1979). These investigators examined the relationship between the behaviors of volunteer Little League Baseball coaches and player cognitions. In phase one of the study, the relationship between coaching behaviors as measured by the CBAS (Coaching Behavior Assessment System) rating scale and post-season player attitudes, beliefs, and self-esteem were examined. The results revealed that coaches who were positively rated by the players gave significantly more technical instruction, reinforcement, and mistake contingent feedback than negatively evaluated coaches, who were more punitive in their actions. Moreover, a significant correlation was found between amounts of technical instruction given and heightened levels of athletic self-esteem, as well as between a positive orientation and global self-esteem. However, no causal relationships could be drawn from these correlational data, and phase two of the project--a field experiment--was conducted.

In the second phase, thirty-four Little League Baseball coaches from the same league used in phase one were randomly assigned to an experimental or a control coaching condition. The coaches in the experimental group attended

two coaching clinics, each two hours in length, where they received information about the psychological aspects of coaching, the role of winning in youth sports, the importance of being aware of their behaviors, the phase one study, and ways to work with young athletes. In addition to the clinic, these coaches used several self-monitoring techniques to increase their frequency of reinforcement by twenty-five percent and decrease their non-reinforcement and use of punishments. The control coaches went on coaching as they normally would and received no training. Both groups were observed at various times during the season.

At the end of the season, over 500 players participating under the guidance of both the experimental and control condition coaches were interviewed individually and asked about their attitudes and beliefs about youth sports. The findings indicated that participants who played for the experimental coaches significantly differed in their attitudes from those who participated for the control condition coaches. The boys who played for the experimental coaches reported that they had more enjoyment, a greater desire to play next year, thought their coaches were more knowledgeable, rated their coaches as better teachers, and liked their team more than boys who played for the control group coaches. The experimental coaches were able to modify their coaching behavior to significantly influence the psychological effects that participation had on the players.

In conclusion, the study by Smith et al. showed that youth sports participation has a potential to have positive effects on the participants. These positive effects will result only from an increased understanding and awareness of the social context in which the child competes. However, awareness alone is not enough. Adult leaders involved in youth sports programs must strive to incorporate this increased understanding into actual coaching behaviors.

SUMMARY

Participation in youth sports programs has increased markedly since their inception in the early part of the twentieth century, but their most rapid growth has occurred in the last two decades. Estimates indicate that three to four times as many children participate in agency or nonschool programs than in interscholastic sports. Part of this difference is from the greater age range of eligibility in agency-sponsored sports. In addition, a philosophy that encourages and permits all children to participate (practiced in some nonschool programs), as opposed to the highly selective process for team membership in interscholastic programs, may account for the greater number of participants at younger ages in nonschool programs. The criterion of proficiency required in interscholastic competition seems to be the standard against which young athletes assess their performance. Consequently, participation in nonschool sports declines rapidly after age fourteen because participants no longer have the prestige of the more highly valued high school sports.

There is little evidence that agency-sponsored and interscholastic sports are endangering the growth of children. The beneficial effects of exercise to stimulate bone and muscle growth at the expense of adipose tissue far outweigh the negative physical qualities. Although fragmentary evidence shows that strenuous, repetitive exercises can curtail growth, prudent judgments in prescribing activities and duration, both daily and seasonally, should eliminate this problem.

A basic problem in providing equable sports competition for boys and girls, in both school and nonschool sports, is deciding on justifiable criteria for classification. Chronological age is routinely used, with the possible exception of wrestling where weight and age comprise the criteria. It is apparent that some measure of body size, along with assessments of skill level and experience must be added to the equation, but a relative weight to be assigned to each has not been determined.

Too often the rules and equipment that are used in adult competition are evoked without modification in the contests played by children. One possible solution is to equate the parameters in proportion to the size of the players, using the game as played by adults as the model from which all modifications are derived.

The psychological influence of athletic competition on young children is viewed in a social context. Children learn and emulate the behaviors they see demonstrated by others whose actions and opinions they value. Therefore, coaches must be consistent in what they say and do in the presence of their players. Sports have a great potential for teaching moral behavior. The variety of emotions they engender and the unpredictable situations that arise in practices and games provide an ideal setting in which to teach such qualities as honesty, loyalty, control of emotions, and sportsmanship.

Youth sports programs are beset with numerous unresolved problems. However, increased participation has brought age-group athletics to the attention of exercise physiologists, sports psychologists, sociologists, and specialists in growth and development. Evidence indicates that the customary speculation and negative commentary of physicians and educators will now be replaced by sound research data on which future programs can be built.

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